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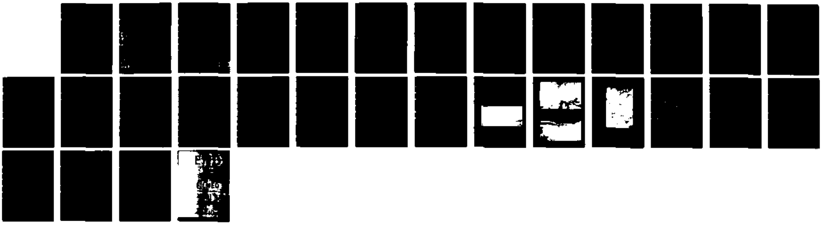

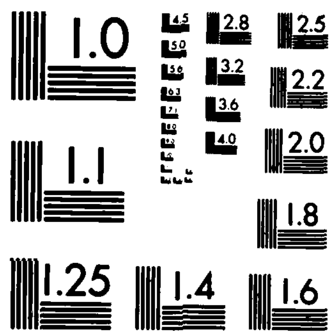

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ARCHAEOLOGICAL RECONNAISSANCE SURVEY

IN THE INARAJAN RIVER VALLEY

TERRITORY OF GUAM

Ms. 031379

ARCHAEOLOGICAL RECONNAISSANCE SURVEY
IN THE INARAJAN RIVER VALLEY
TERRITORY OF GUAM

by

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ABSTRACT

Under Contract DACW84-77-C-0019 with the U.S. Army Engineer Division, Pacific Ocean, members of the Department of Anthropology, Bernice P. Bishop Museum, Honolulu, Hawai'i, conducted an Archaeological Reconnaissance Survey in the Inarajan River Valley, Territory of Guam. This study supplemented earlier reconnaissance-level survey in the Ugum River Valley, as part of the Army Corps' efforts to identify cultural resources in all alternative areas proposed for reservoir construction. The c. 706-acre survey area includes that portion of the Inarajan River drainage and adjacent ridges that will be subject to inundation in the event of proposed construction.

Historical research at the Micronesian Area Research Center, University of Guam, and at the Bishop Museum library indicated that portions of the Inarajan area were cultivated in the nineteenth century and early twentieth century. Crops included rice, coconut, cacao, and coffee. Present-day land use is limited to hunting and fishing; a single pasture was noted during fieldwork.

Reconnaissance survey involved walking transects through the survey area's two microenvironmental zones. Approximately 4 acres (1.5%) of Zone I (alluvial flats and taluvial slopes) and 26 acres (6%) of Zone II (savanna) were sampled. Three extensive areas of prehistoric activity, evidenced by ridge-crest pottery scatters, were located within the survey boundaries; these have been assigned temporary designations as Sites A, B, and C. A portion of one of these areas had been previously reported by Reinman as Site 66-05-0103. As probable remnants of large, complex, and as yet incompletely described sites of unknown function and structure, these sites may be expected to yield data relative to a number of research questions. Portions of Sites A and C would be impacted by the proposed construction; test excavations and intensive mapping are recommended to determine National Register eligibility and need for mitigative measures prior to commencement of any construction activities.

ACKNOWLEDGEMENTS

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INTRODUCTION

Under Contract DACW84-77-C-0019 with the U.S. Army Engineer Division, Pacific Ocean, members of the Department of Anthropology, Bernice P. Bishop Museum, Honolulu, Hawai'i, conducted an archaeological and historical reconnaissance survey of portions of the Inarajan River drainage system in southern Guam. The survey was undertaken between December 28, 1978, and January 3, 1979, under the direction of the author, with the assistance of Paul Cleghorn and Nolan Hendricks.

Reconnaissance survey, designed to determine the presence or absence of archaeological and/or historical sites, is the initial step in identifying sites that may be eligible for inclusion in the National Register of Historic Places and determining actions that may be required to mitigate the adverse effects of federal construction activities, in this case, the proposed dam construction and subsequent flooding of a portion of the Inarajan River drainage. The feasibility and environmental impact of reservoir construction on the Inarajan River are being explored as an alternative to the proposed Ugum River site (see Piper 1946:41; Dye et al. Ms.).

DESCRIPTION OF SURVEY AREA

The c. 706-acre survey area (Fig. 1) includes that portion of the Inarajan River drainage subject to proposed inundation, and adjacent savanna-covered ridges in the Inarajan District of southeastern Guam (Inarajan Quad, U.S.G.S. 1:24,000). The area is a dissected sloping and rolling land, characteristic of southern Guam (Fig. 2), developed in volcanic substrate of the Bolanos pyroclastic member of the Umatac formation (Tracey et al. 1965:plate 1). The Bolanos pyroclastic member within the survey area consists of thin, bedded, tuffaceous sandstone, abundantly visible in highly eroded upland areas overlying a water-laid tuff breccia, best exposed along the north face of the Inarajan Valley.

The Inarajan River and its tributary river systems--the Pasamano, Yledigao and Laolao--compose the major landform within the survey area and drain about five square miles of southern Guam (Ward et al. 1965:6). The Pasamano River and its tributary, the Dante River, have their headwaters on the NE flank of

Mt. Sasalaguan and flow E. The Yledigao River and its tributaries, the Nelansa and Topony Rivers, begin in Atate and flow SE over Inarajan Falls to their confluence with the Pasamano River at the head of the Inarajan River, c. 40 ft above sea level (asl). The Laolao River system and its tributaries, the Finatasa* and Fensol Rivers, flow S fran Dandan, joining the E-flowing Inarajan about 1.3 km W of that river's mouth at Inarajan Bay. The Pasamano, Yledigao, and Laolao are small, shallow, swift rivers that cascade over a series of short, scenic waterfalls (Fig. 3). The Inarajan River, by comparison, is deep and sluggish. The banks of all these rivers, save the Laolao, are deeply cut and steep.

The land overlooking the rivers is gently rolling, with a slight downward slope to the E. Severe erosion of tuffaceous sandstone has left small grassy mesas surrounded by barren basins of exposed reddish sandstone (Fig. 4). Ridges with frequently bare knolls of tuff breccia descend from the upland to the rivers. Ridges on the N side of the valleys are generally more abrupt than their southern counterparts.

Upland soils in the survey area are clays of three types that Stensland (1959:134) has segregated into two mapping units on the basis of their relative dominance within a geographic area. Atate clay, a granular-structured, acid Latosol, is restricted to the small, erosionally isolated mesas (Ibid.). Soil of the erosional scars surrounding mesas is classified as Agat clay, a reddish, granular Latosol, generally lacking any upper B horizons (Ibid.:144). A profile of this soil from within the survey area is described by Stensland (Ibid.:144). Asan clay, an acid, pale-yellow to pale-olive Regosol, occurs on the steeply sloping valley sides and on small ridges running down to the rivers, where erosion and soil slippage are active (Ibid:148). Pago clay, an alkaline-to-neutral, brownish alluvium, covers the valley flats throughout the survey area. This soil, while moderately well drained, is subject to occasional flooding (Ibid.:150).

Vegetation in the survey area may be divided into two micro-environmental zones, essentially similar to those defined for survey of the Ugum River Valley (Dye et al. Ms.:2, 33). Plant identifications were made with reference to Stone (1970). Zone I is a mixed, broadleafed, tropical forest (Fosberg's Unit 2;

*Local informants confirmed that the spelling "Fintasa" on the U.S.G.S. Inarajan Quad is incorrect.

Tracey et al. 1959:171) on volcanic soils, dominated by ravine forest of variable composition. This forest covers the alluvial flats of the rivers and the taluvial slopes of the valley sides. Except along the Pasamano River and the lower reaches of the Inarajan, the forest is characterized by a low, uneven canopy of *Hibiscus tiliaceous* L., *Pandanus dubius* Sprengel, *P. fragans* Gaud., *Cocus nucifera* L., *Areca cathecu* L., *Ficus* sp., *Mangifera indica* L., *Artocarpus incisus* (Thunb.) (and hybrids of *A. incisus* and *A. mariannensis* Tricul.), with a thick undergrowth of *Triphasia trifolia* (Burm f.) P. Wils., *Cycas circinalis* L., *Piper guahamense* DC., and *Morinda citrifolia* L., and with occasional *Musa* sp., *Zingiber* sp., *Alocasia macrorrhiza* (L.) Schott, and other unidentified species. *Bambusa* sp. is found in thick stands near the rivers, and the reed *Phragmites karka* dominates in small marshes near spring sources. The Pasamano River is noteworthy in the extreme dominance of largely senescent *C. nucifera,* the high incidence of *A. macrorrhiza* and *Musa* sp., and the occurrence of *Carica papaya* L., *Capsicum frutescens* L., and *Colocasia esculenta* (L.) Schott, all feral cultigens (Fig. 5). Along the lower reaches of the Inarajan River, especially on the south bank, the forest is sparse; various grasses flourish, as does *Cordyline fruticosa* (L.) Goepp.

Zone II is a savanna grassland (predominantly *Miscanthus floridulus* [Labill.] Warburg ex Schum & Lauterb.), with numerous, severe erosional scars, that follows ridges north and south of the Inarajan River and between the Yledigao and Pasamano Rivers. South of the Inarajan River at Socogna is a fenced pasture of an unidentified grass and various unidentified herbaceous species. Fire plays a major role in maintaining the savanna; two fires, deliberately set, were witnessed during fieldwork.

PREVIOUS INVESTIGATIONS

A brief overview of archaeological investigation in the interior of southern Guam has been presented elsewhere (Dye et al. Ms:5-7).

Archaeological work within the study area has been carried out by Reinman, for both the Bishop Museum and the Field Museum of Chicago (Guam Historic Preservation Plan 1976; Reinman 1977). Only one site identified by Reinman, the Inarajan Bluff site (66-05-0103), was found within the study area. This site, a scatter of pottery, chert, and at least one slingstone, was considered to be of minimal archaeological significance due to its eroded nature. Two other sites located by Reinman, MaGI-5 and -34 (Reinman 1977:fig. 1) may well lie within the study area. Site MaGI-5 is described simply as a large site, formerly with nine *latte* (Ibid.:18). An earlier report noted that this site formerly consisted of "at least 7 sets of *latte*," all but one of which has been destroyed by clearing for agriculture. Surface artifacts included pottery, stone mortars, and stone tool fragments (Reinman 1966:35). Judging by its location (Reinman 1977:fig.1), and description (Reinman 1966:37), it may be synonymous with Site 66-05-0103.

Based upon the shallow, sparse nature of midden deposits in upland areas, Reinman opines that settlement of the inland areas of Guam was either seasonal, a pattern observed today on inland Guamanian ranches, or very late, perhaps as a reaction to the presence of Spanish missionaries and soldiers (Reinman 1977:19, 20).

CULTURE HISTORY

Guam's first inhabitants probably discovered the island sometime in the second millenium B.C. Reinman's early radiocarbon date of 1320±170 B.C. (GAK-1364) for the Nomna Bay site is suspect, however, as a much later date was returned on materials recovered from a stratigraphically lower context in the same site. No mechanism has been proposed that would adequately account for any stratigraphic inversion. The earliest reliable date for Guam comes from the Talofofo River Valley site (MaGI-8), which dates to 270±90 B.C. (GAK-1359) (Reinman 1977:30). Spoehr obtained a radiocarbon date of 1527±200 B.C. from the Chalan Piao site on nearby Saipan, and this figure is widely used as a base line for settlement in the Marianas (Spoehr 1957:66). More recent work at Laulau Bay on Saipan supports the antiquity of this latter date (Marck, pers. comm.).

The preservable material culture of these settlers is dominated by a well-made, thin, red-slipped pottery, dubbed Marianas Red by Spoehr. This pottery was superseded by a more crudely fashioned, thick, predominantly plain ware, which Spoehr called Marianas Plain. This pottery is characteristic of the megalithic *latte* phase of Marianas prehistory, which Spoehr, on the basis of a single radiocarbon date from Saipan, believes to have begun about A.D. 845±145 (Spoehr 1957:171). Reinman suggests that the criteria used by Spoehr to differentiate Marianas Red from Marianas Plain do not work well on Guam and that the criterion of temper material is more valid (Reinman 1977:56). He has thus established Calcareous Sand Tempered Wares (CST) and Volcanic Sand Tempered Ware (VST) as the two types of prehistoric Guamanian pottery.

The function of *latte* stones has yet to be determined conclusively, though there is general agreement that they supported some type of structure. Yawata (1963:92) notes the resemblance of the shape of the *latte* capstones to that of present-day rat preventers on granaries built by mountain tribesmen of Northern Luzon in the Philippines. Spoehr, based on the occurrence of kitchen debris around *latte* structures, suggests that they may have housed extended families. Oversized, centrally located *latte* structures "may represent men's houses or the residences of chiefs" (Spoehr 1957:172).

HISTORIC LAND USE

Inarajan District is mentioned only briefly in early European accounts of Guam, perhaps because of its position on the opposite side of the island from St. Luis d'Apra Harbor. Also, the trail that served the town of Inarajan was impassable during and after heavy rains, until a paved road was constructed in 1952 (Beaty 1967:23). Crozet noted the presence of savanna in central Guam in 1771 and made claims for its origin in Spanish times: "The forests are generally very dense. Long ago the Spaniards cleared spaces of land for pastoral purposes." Crozet praised the smaller clearings, noting that "vast prairies entirely cleared are not a success in the torrid zone" (Rochon 1891:85). In 1870, Governor Felipe de la Corte described south central Guam as follows:

> In places there are also deposits of red and yellow clays or ochres, which are almost bare of vegetation, or covered only with certain plants similar to the 'esparto' (feather-grass), or by a tall grass called 'Nete' [Corte 1870:13].

By 1913, it was reported that

> ...the southern section of the island consists of an undulating plain covered with uncultivated grasses, primarily swordgrass (neti). The largest cattle ranges were established on the savannas of the south [*Annual Rept.* 1913:15].

The first mention of lands that lie within the present study area may be contained in the writings of Don Francisco Ramón de Villalobos, who, in 1831, took steps to increase the production of rice on land east of Inarajan village (Safford 1901:165). Governor de la Corte reported in 1875 that "only on the Eastern side of the Inarajan plain can this harvest [rice] be considered averagely safe" from wind disturbance. However, the conditions were

> ...unfavorable to extract its fruit, as it is very difficult to reach by land and by water one would have to struggle against a narrow strait at the exit of its small port and a coast constantly whipped up by the East breeze [Corte y Calderon 1875:134].

For three parcels that are either within or adjacent to the survey area, land records remain from the early 1900s. They mention: (1) "coconut, cacao, and coffee planted soil in Guigao [Geugao] and Sococna [Socogna]" with a "swamp called Lomocpoc" to the south (Espinosa 1945:570); (2) "coconut grove in Asafan" in cultivation for 17 years by 1898 (Ibid.:576); and (3) a "rice field in Guatata" (Ibid.:586).

Census figures for Inarajan between 1831 and 1897 are tabulated by Underwood (1973:27). The average population for this period is 295, ranging from a low of 156 in 1871 to a high of 439 in 1886. In 1897 the Inarajan population was 261, only slightly above the figure of 246 for 1831. During World War II the population of Inarajan swelled: "Japanese soldiers (c. 5,000) lived in Inarajan during WWII, moved into people's houses and forced people to work rice fields..." (Caton 1965:35).

Present-day land use within the study area is limited. A single pasture (see p. 4) at Socogna was noted during fieldwork, but was not in use at that time. Traps for crayfish are set frequently in the rivers, and savannas are often burned in the hope that deer will be attracted to the new growth of swordgrass. A concrete water catchment along the Laolao River now appears to be non-functional.

FIELD METHODS

An archaeological reconnaissance survey is designed to determine the presence or absence of sites within a specified area. These data are then used to formulate responsible recommendations on the nature and extent of further archaeological work necessary to determine National Register eligibility for sites that will be impacted by the construction activities.

The project Scope of Work item 5a(1) specified, on the basis of survey results from the Ugum River Valley (Dye et al. Ms.), that transects

> ...be walked along the alluvial flats in the valley bottom, especially in the eastern portion of the study area and along the inter-valley savanna-covered ridges.... Transects down the taluvial slopes of the valley may be conducted where ridgeline sites are discovered [Scope of Work dated 24 October 1978].

The study area sample was thus stratified to effect a relatively greater coverage of savanna-covered ridges and alluvial flats with a correspondingly less intensive survey of valley sides. Figure 1 shows approximate paths of transects walked. In the savanna areas (Zone II) the archaeologists ~e spaced c. 10 to 15 meters apart, giving an effective transect width : c. 30 to 45 meters. Rugged terrain and locally impenetrable vegetat: · pre-cluded similar methodology along alluvial flats and taluvial slopes . I). In these areas, the archaeologists walked (or crawled) single-file,) ..ding an effective transect width of 5 to 10 meters, depending upon vegetation density.

The length of each transect has been computed from Figure 1, with the resulting total from each microenvironmental zone multiplied by the respective effective transect width, yielding an estimate of the area surveyed within each zone. These figures were then compared with the total area of each zone, as determined by polar planimeter measurements of U.S.G.S. 1:24,000 maps. The resulting figure, a minimum percentage of the zone surveyed, is an estimate of the survey intensity within each zone. Results are presented in Table 1.

When an archaeological feature was located, the surrounding area was surveyed intensively, its position was plotted on a U.S.G.S. topographic map, and notes were taken on aspects of feature morphology, local topography, geography, vegetation, and any relationship with previously located features. Artifacts were recorded and left in the field.

SURVEY RESULTS

A total of approximately 30 acres, 4% of the project area, was surveyed. As noted above, the savanna-covered ridges and forested alluvial flats received the most intensive coverage, with taluvial slopes of the valley sides receiving only cursory examination.

Three extensive areas of prehistoric activity, evidenced by ridge-crest pottery scatters, and a single scatter on an alluvial terrace, were located within the survey boundaries during reconnaissance (Fig. 6). A portion of one of these areas was reported by Reinman as Site 66-05-0103. The sites described below have been assigned temporary designations until further work delimits their full extent. The description of Site 66-05-0103 may be expanded with further study to more fully reflect the true extent of this activity area.

These three large areas are each designated as single sites on the basis that no clear break between individual pottery deposits is evidenced, either by lack of surface artifacts or by the presence of any outstanding physiographic feature. Further, field data favor an interpretation of present pottery distribution as a function of natural processes subsequent to deposition, rather than of culturally determined patterns at the time of deposition. These data and derived hypotheses are discussed fully below.

SITE A

Site A, including Site 66-05-0103, is an extensive scatter of pottery sherds, including portions of vessel rims and bodies, and chert and slingstones, found *in situ* in Atate clay on erosionally isolated mesas and in Asan clay on ridge crests, and secondarily deposited on hillsides and erosional basins. The site extends from the crest of the 442-ft hill north of Inarajan Falls, east along the ridge crest, to the survey boundary at Guatata and follows both the heavily eroded ridges that fall from the main ridge to the river and the two knolls immediately east of Laolao river (Fig. 1). Pottery is a plain, volcanic sand-tempered ware (VST), quite common in the interior of Guam (Reinman 1977; Dye et al. Ms.). Two slingstones, both of extremely weathered, easily shaped, green stone, resemble those illustrated by Safford (1905:pl.17) and Thompson (1932:50, fig. 22a) and classified by Thompson as Type 1. They are elongate with pointed extremities and a circular cross section. This type is more common on Guam than on the other Mariana Islands (Thompson 1932:50).

To determine the history of soil formation and/or deposition on study area ridge crests, a test pit, c. 20 cm wide, was excavated c. 10 cm into the face of an eroding, pottery-bearing soil at the E crest of the knoll located just east of the confluence of the Inarajan and Laolao Rivers. The excavated soil is surrounded by bare tuff brecia that, in low-lying areas, contains small pockets of high-mineral sediment and scattered pieces of secondarily deposited pottery. The soil profile is described as follows:

Horizon	Depth (cm) below Surface	Description
A	0-1.5	Very dark brown (10YR2/2d)*, very fine to fine granular structure, sticky, plastic clay with abundant rootlets. Abrupt, smooth boundary.
B	1.5-35.5	Very dark greyish-brown (2.5Y3/2d), strong angular blocky structure, very sticky, very plastic clay with some rootlets. Contains pottery. Clear, wavy boundary.
C	35.5-42.5+	Very pale brown (10YR7/4d), fine to medium granular structure, slightly sticky, non-plastic clay.

The excavation site presently supports an impoverished community of *M. floridulus*, sensitive plants, wild mint, and buffalo grass.

SITE B

Site B is an extensive scatter of both *in situ* and secondarily deposited pottery on savanna-covered ridges between the Yledigao and Pasamano Rivers. This scatter of artifacts is probably associated with Site 66-05-0107, a large *latte* site in forest to the west, designated "Valuable" in the Guam Historic Preservation Plan (1976:52). Similar site configurations were noted at sites MaGT-25 and -28 in the Ugum River area of Talofofo District (Dye et al. Ms.). Pottery sherds examined were plain VST ware that varied in thickness from 5 to 17 mm. Surface color of sherds found *in situ* differed significantly from those discovered in an eroded context. *In situ* pottery exhibits a dark red surface (2.5YR3/6), while the more highly weathered rough surface of secondarily deposited pottery is a yellowish red (5YR4/6).

SITE C

Site C is an extensive scatter of *in situ* and eroded pottery, and a single adz, located both in savanna and ravine forest along the south side of the Pasamano and Inarajan Rivers. The distribution of pottery along the ridge crest is similar to that of the savanna north of the river, i.e., *in situ* in erosionally remnant Atate Clay and diffusely scattered on ridges that are largely without soil. Pottery is also present on small forested ridges from 3 to 15 meters above the river level and on an alluvial terrace at Geugao. The soil drainage along these small forested ridges is

*Munsell color chart designation.

very poor, and pottery is usually found on the crest of knolls where drainage is improved.

The adz, of a vesicular volcanic stone with a few dark phenocrysts, has been completely ground, showing no evidence of previous manufacturing stages. It has been broken near the butt. The tool is oval in cross section with a length of 66.8 mm, width at the break of 46.8 mm, and a thickness at the break of 37.2 mm. The bevel (27.1 mm in width) is virtually symmetrical in section, and, lacking a distinct bevel chin, grades smoothly into the back of the tool (Fig. 7).

DISCUSSION

Three large prehistoric activity loci, evidenced by scatters of pottery with very few associated stone artifacts, are defined within the study area.

The study area is significant because of the paucity of archaeological data available for inland Guam. These data have thus far generated broad hypotheses on the nature of inland settlement (Reinman 1977:19; Dye et al. Ms.:22, 23), and have helped to define pertinent research questions (Dye et al. Ms.:24, 25). Data collected during the present survey are useful in further refining these hypotheses and questions.

Site distribution patterns noted for the Ugum River (Dye et al. Ms.:22)--i.e., *latte* stones on forested ridges associated with pottery scatters in adjacent savanna--were found to occur along the Inarajan River drainage as well (see Site B, above), considerably strengthening the hypothesis that this pattern applies generally to inland settlement in southern Guam. The extent of pottery distribution in the study area (Fig. 6), in areas that are relatively far from known *latte* sites, suggests that the activity(ies) associated with pottery deposition in areas now in savanna may have been independent of prior establishment of nearby *latte*. Alternatively, *latte* sites associated with these pottery scatters may have been destroyed, or may be as yet unrecorded.

Reinman's hypotheses that (1) "interior sites have large numbers of *latte* structures on them," and that (2) "the lack of living debris [near latte sites] suggests that occupation was either very late, infrequent (seasonal) or both" (Reinman 1977:19), appear to reflect a misunderstanding of the nature of interior sites and an assumption that patterns of pottery and midden distribution are attributable to cultural processes at the time of deposition rather than to natural processes post-deposition.

During fieldwork, a positive correlation was noted between the number of pottery sherds found on any ridge and the amount of developed soil (Atate or Asan clay, as opposed to Agat clay or bare bedrock) present on the ridge crest. Ridges nearly bare of developed soil yielded only a few well-eroded pottery sherds (with two exceptions where no pottery was found). Ridges with deposits of Atate or Asan clay generally exhibit numerous sherds, both *in situ* and in secondary deposits. Two hypotheses, both of which assume a correlation between well-developed soils and pottery deposition, could account for the present distribution of pottery:

(1) The prehistoric distribution of soil was similar to that found today. On ridges where there was no soil, no pottery-depositing activites took place.

(2) All ridges were at one time covered with a well-developed soil and pottery was deposited on all ridges. On some ridges, where erosion has been especially fierce, most of the pottery has eroded away. Where erosion has proceeded more slowly, both soil and pottery remain.

The stratigraphic profile described above was excavated as a test of these hypotheses and suggests an on-going soil erosion process that is strongly supportive of the second hypothesis. The position on the top of the knoll, with a clearly eroding face surrounded by bare parent material, indicates that the soil is a remnant of a once larger soil expanse. The clear, wavy boundary between horizons B and C indicates that the soil (in this case Asan clay) developed *in situ* through weathering of the parent material. If soil erosion continues (there is no evidence to suggest that it may cease) then at some time in the future the Asan clay will have completely eroded away, leaving behind only those constituents of a size sufficiently large to resist the rill and sheet wash that accompanies each heavy rain on savanna-covered slopes. One of these constituents would be a few pottery sherds, of a sufficiently large size and flat shape to resist overland transport by running water.

A corollary of this model of pottery deposition on the well-developed soil of ridge crests and subsequent erosion is that the vegetation type at the time of pottery deposition was different than that found in the area today. A quick walk along any upland ridge in southern Guam offers sufficient proof in the vast expanses of bare, eroding soil, that savanna vegetation with its extreme susceptibility to fire does not protect these volcanically derived soils from erosion. Botanists Fosberg and Stone both opine that the interior of southern Guam was once nearly completely forested (Fosberg 1960:33,34; Stone 1970:14), though the floristic composition of this forest is as yet unknown. However, any tropical forest, with its extensive root network and vast store of plant nutrients in the biomass, would effectively stabilize both the physical and chemical components necessary for soil development.

The relative contribution of prehistoric man to the origin and development of savanna on southern Guam (as opposed to the effects of Spanish cattle introduction, or the WWII U.S. military invasion of the island, to mention only two of the more major catastrophes visited upon Guam's vegetation) is a problem that remains for future research. The point, however, is simply that patterns of pottery distribution observed today appear to be artifacts of the severe erosion that has taken place subsequent to pottery deposition. Any assessment of prehistoric man's use of, and adaptation to, the interior of southern Guam must take this into account. A characterization of inland Guam sites in terms of the number of *latte* structures present ignores the greater area of any interior site--i.e., the extent of pottery scatters--and is at best misleading.

The "lack of living debris" near inland *latte* sites (Reinman 1977:19) may also be a function of the environment, rather than a readily quantifiable indicator of past human activity. Debris from a prehistoric meal could conceivably include vegetable matter, bone from marine or terrestrial vertebrates, and the shells of invertebrates. Vegetable matter preserves only in unusual circumstances, either in dry, preferably cold, caves or submerged in water. It survives on open sites only as charcoal. Bone and shells are composed primarily of calcium carbonate, a substance whose solubility increases with the acidity of the surrounding medium. Given that all of the soils in the interior of southern Guam, with the exception of alluvium along rivers, are acid (pH 5.0-6.5), it is to be expected that living debris composed of calcium carbonate would readily disintegrate.

In this light, the settlement of Guam's interior cannot be fully explained in terms of relatively late migration of seasonally residing *latte* builders. Instead, the wide distribution of pottery on ridges adjacent to rivers, the magnitude of ecological change on the whole of southern Guam, and the apparently long prehistory of man on the island impel a consideration of settlement models based on long-term exploitation of, and adaptation to, the changing resources and constraints of the environment of inland Guam.

IMPACT

Dam construction on the Inarajan River and subsequent flooding of portions of the Inarajan, Laolao, Pasamano, and Yledigao rivers to an elevation of c. 140 ft asl would have a direct impact on low-lying areas of Site C, especially at Geugao, and on the eastern portion of Site A in areas of proposed dam construction. *In situ* pottery deposits at Sites A and B and those in savanna at Site C are high enough above and far enough removed from the area of proposed inundation to be considered safe from reservoir-induced erosion.

Any subsequent use of the reservoir for recreational activities open to the public, or construction on ridges overlooking the reservoir, would adversely impact the remainder of Sites A and C and all of Site B, either by affording increased access and thus enhancing erosion, or more directly by grading and stabilization of soil.

SIGNIFICANCE OF SITES

The significance of archaeological sites is based upon potential for further research or interpretive display. Areas of *in situ* pottery directly impacted by the proposed project will lose this potential on inundation. The lack of surface structures negates any potential for interpretive display. By themselves these deposits are unlikely to yield information that will be important to prehistory or history and thus appear to be ineligible for inclusion in the National Register of Historical Places. However, as noted above, these pottery deposits cannot be considered as isolated phenomena, but must be viewed in the broader context of man's activity in inland Guam and more specifically as a portion of large, complex, as yet incompletely described sites of unknown function and structure. As such, to provide an adequate evaluation of significance, these deposits demand a fuller characterization and description than the time limits of the present survey have allowed. This characterization and description may be expected to yield data relative to a number of research questions (see Dye et al. Ms.:24,25):

(1) What is the spatial relationship between archaeological features and (a) dominant landforms, (b) locally available resources (e.g., water, cultivable land, clay), and (c) other archaeological features?

(2) What is the time frame for inland settlement?

(3) Was the inland settlement seasonal or permanent?

(4) What were the subsistence activities of the inland *latte* inhabitants?

(5) What is the material culture associated with inland habitation?

RECOMMENDATIONS

Based on the above discussions, specific recommendations for further archaeological work are made for each of the three sites recorded during field survey.

SITE A

The extreme eastern portion of Site A, consisting of two small deposits of well-developed soils with *in situ* pottery, would be directly affected by proposed dam construction. These two loci are presently eroding rapidly. Description of their present extent, determination of their probable former extent as evidenced by contiguous areas of bared rock, and a statistically valid program of test excavation with the aims of (1) retrieving a sample of the preservable material culture associated with inland settlement, and (2) obtaining datable materials, would provide sufficient data for determination of National Register eligibility. Further objectives, especially those concerning the distribution of artifacts within the site, may be obviated by the severely eroded nature of the deposits.

The remainder of Site A would not be directly affected by proposed dam construction and no further archaeological work need be done until such time as other federal construction activities or intensified recreational use are proposed. The objectives of this work would be similar to those outlined above, with the exceptions that spatial analyses and a consideration of current research problems would be important.

SITE B

Site B would not be directly affected by proposed dam construction and subsequent inundation. Its position between the Yledigao and Pasamano rivers makes it the most difficult of access of the sites noted here. In the event of other federal construction activities, recommendations similar to those outlined for Site A pertain.

SITE C

Site C contains the most extensive areas that would be directly impacted by the reservoir. These *in situ* pottery deposits, on small, poorly drained ridges in ravine forest, are located only a few meters above stream level and would be completely inundated. The areal extent of these deposits should be determined and mapped, detailed descriptions of the flora both within and proximal to the site should be made, and a series of test excavations with the aim of characterizing the nature of the deposits and determining National Register eligibility should be completed. Specific attention should be paid to the possible contiguity of these deposits with those located in adjacent savannah.

The remainder of Site C, higher in elevation, would not be directly impacted by the proposed project and no further work need be done. In the event of subsidiary federal development of the area, recommendations for salvage as presented for Site A should be followed.

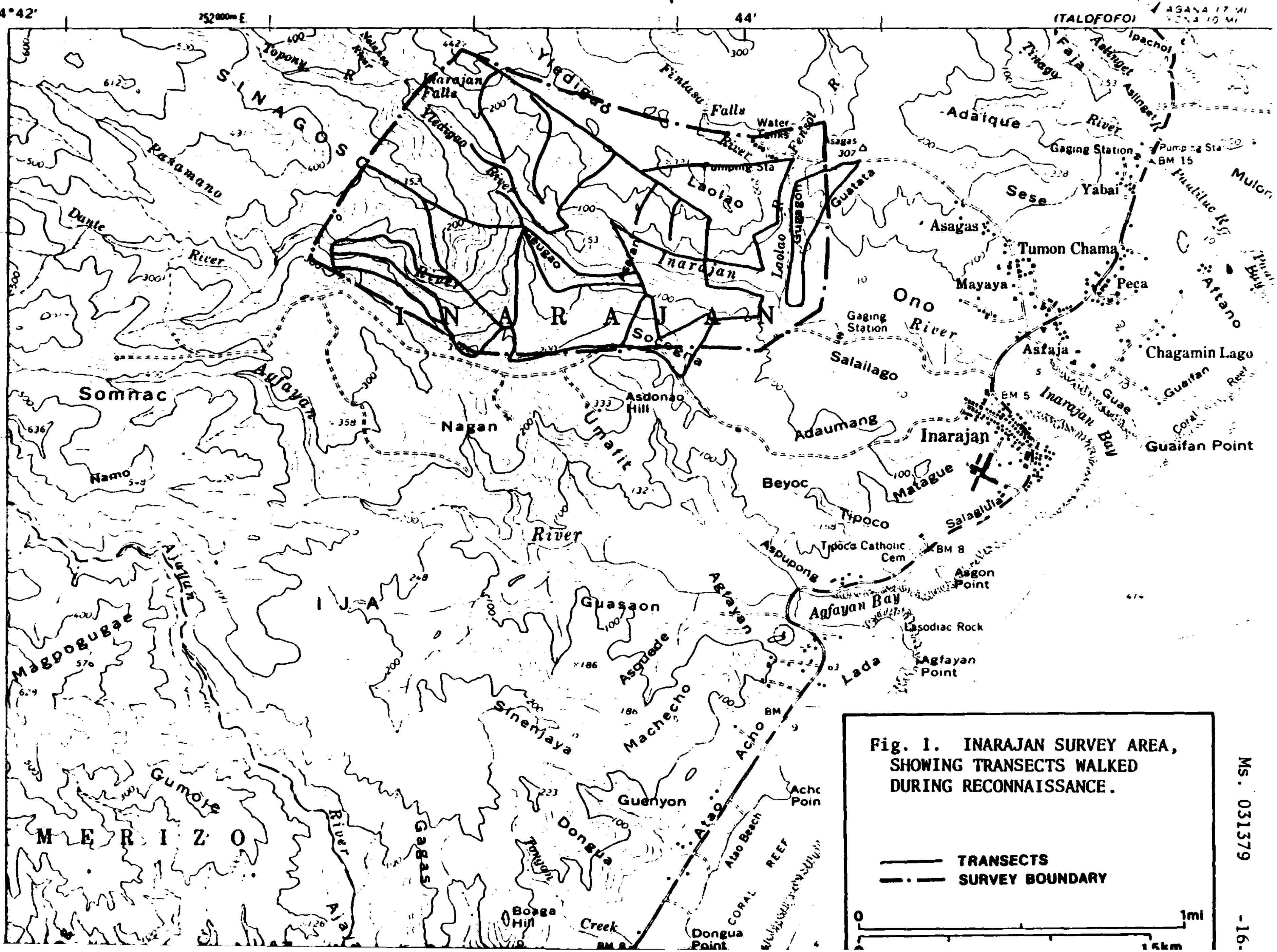

Fig. 1. INARAJAN SURVEY AREA, SHOWING TRANSECTS WALKED DURING RECONNAISSANCE.

Fig. 2. VIEW OF INARAJAN SURVEY AREA, FACING E.

Fig. 3. THE PASAMANO RIVER. Note the absence of alluvium.

Fig. 4. EROSIONAL BASIN WITHIN SITE A.

Fig. 5. FERAL CULTIGENS NEAR PASAMANO RIVER.
Note *A. macrorrhiza, C. papaya,* and *Musa* sp.

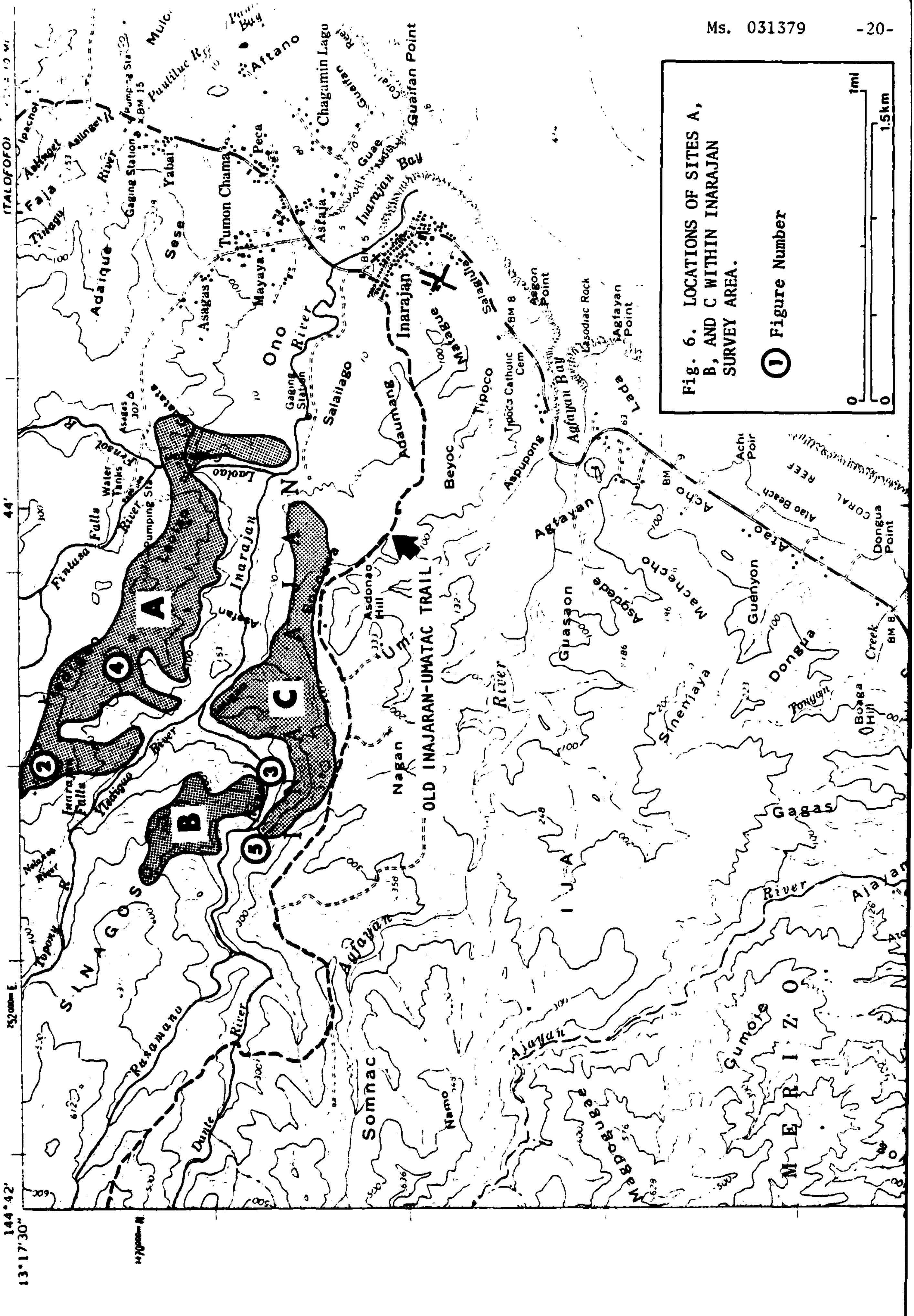

Fig. 6. LOCATIONS OF SITES A, B, AND C WITHIN INARAJAN SURVEY AREA.

1 Figure Number

0 1mi

0 1.5km

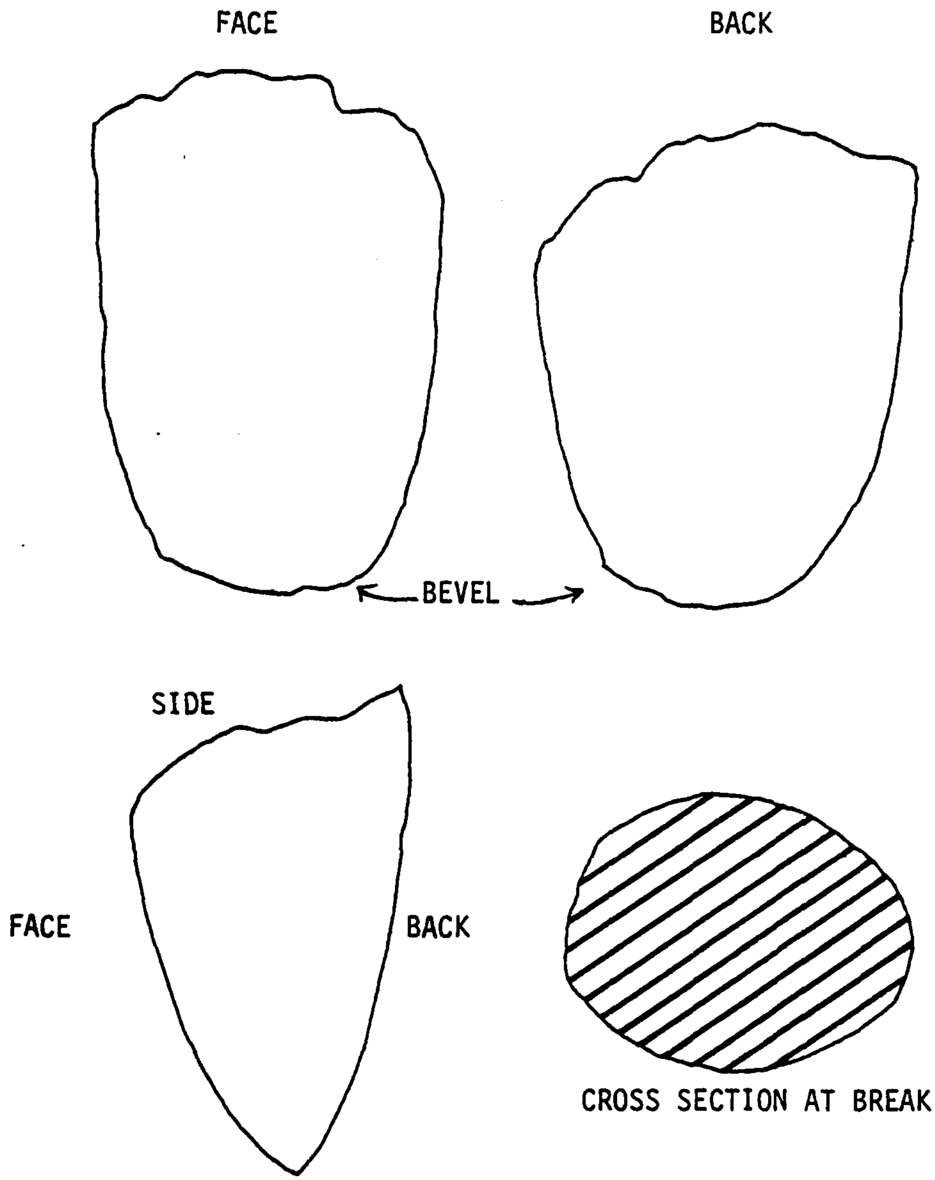

Fig. 7. ADZ FOUND AT SITE C, INARAJAN SURVEY AREA (actual size).

Table 1. INTENSITY OF RECONNAISSANCE SURVEY WITHIN MICROENVIRONMENTAL ZONES, INARAJAN SURVEY AREA.

Zone	Total Acres	% Survey Area	Acres Surveyed	% of Zone
I	270	38	4	1.5*
II	436	62	26	6.0
Totals	706	100	30	4.2

*Forested, taluvial slopes of the valley sides, the major component of Zone I, were exempted from survey. Thus, the percentage of the alluvial flat area within Zone I received a much more intensive coverage than is indicated by this figure.

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